

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A light beam scanning apparatus comprising:

light beam emitting means for outputting a light beam;

a beam scanner for reflecting the light beam output from said light beam emitting device towards a to-be-scanned surface to scan the to-be-scanned surface by use of the light beam in a main scanning direction;

a ~~first~~ beam position detector including a first beam sensing section for detecting the light beam scanned on the to-be-scanned surface by said beam scanner and said beam position detector generating an ~~analog signal~~ whose analog level which is continuously changed with a variation in the passage position in a sub-scanning direction perpendicular to the main scanning direction of the light beam; and

a controller for controlling the position of the light beam scanned by said beam scanner on the to-be-scanned surface to a preset position based on the ~~result of detection of~~ analog level of the output of said first beam position detector.

2. (Currently Amended) The light beam scanning apparatus according to claim 1, in which said light beam emitting means includes a plurality of light beam emitting devices and said beam scanner scans the to-be-scanned surface by use of a plurality of light beams emitted from said plurality of light beam emitting devices and which further comprises light beam passage position changing means of a number smaller than the number of said plurality of light beam emitting devices ~~by one~~, for changing the passage position of the light beam in the sub-scanning direction; said controller determining one of the plurality of light beams as a reference beam and changing the relative passage

position of the remaining light beams with respect to the passage position of the reference light beam by use of said light beam passage position changing means.

3. (Currently Amended) The apparatus according to claim 1, which further comprises ~~a second beam position detector~~ passage detecting means including a second beam sensing section arranged on the upstream side in the main scanning direction of the light beam with respect to the first beam sensing section of said first beam position detector, ~~for said passage detecting means~~ detecting the passage of the light beam scanned by said beam scanner and generating a timing signal; ~~and integrating means for integrating the output of said first beam position detector in response to the timing signal from said second beam position detector; and in which said controller controls the passage position of the light beam to a preset position based on the result of integration of said integrating means.~~

said beam position detector starting a beam passage position-sensing operation in response to the timing signal from the passage detecting means.

4. (Currently Amended) The apparatus according to claim 4~~3~~, which further comprises:

~~a second beam position detector arranged on the upstream side in the main scanning direction of the light beam with respect to said first beam position detector, for detecting the passage of the light beam scanned by said beam scanner and generating a first timing signal;~~

~~a third beam position detector~~ second passage detecting means including a third beam sensing section arranged on the downstream side in the main scanning direction of the light beam with respect to the first beam sensing section of said first beam position detector, ~~for said second passage detecting means~~ detecting the passage of the light beam scanned by said beam scanner and generating a second timing signal;

~~integrating means for integrating the output of said first beam position detector in response to the first timing signal from said second beam position detector; and~~

~~converting means for converting the result of integration by said integrating means from an analog signal to a digital signal in response to the second timing signal from said third beam position detector for converting the analog level of the output, generated by the beam passage position sensing means into a digital signal in response to the second timing signal from the second passage sensing means; and in which~~

said controller controls the passage position of the light beam to a preset position based on the digital signal converted by said converting means.

5. (Currently Amended) The A light beam scanning apparatus according to claim 1 comprising:

light beam emitting means for outputting a light beam;

a beam scanner for reflecting the light beam output from said light beam emitting device towards a to-be-scanned surface to scan the to-be-scanned surface by use of the light beam in a main scanning direction;

a first beam position detector for detecting the light beam scanned on the to-be-scanned surface by said beam scanner and generating an analog signal which is continuously changed with a variation in the passage position in a sub-scanning direction perpendicular to the main scanning direction of the light beam; and

a controller for controlling the position of the light beam scanned by said beam scanner on the to-be-scanned surface to a preset position based on the result of detection of said first beam position detector,

wherein said first beam position detector includes second and third beam position detectors;

said second beam position detector generates an output which continuously decreases with a variation in the passage position of the light beam in the sub-scanning direction,

said third beam position detector is disposed separately from said second beam position detector in the sub-scanning direction and generates an output which continuously increases with a variation in the passage position of the light beam, and

said controller controls the passage position of the light beam to a preset position based on the results of detection of said second and third beam position detectors.

6. (Original) The apparatus according to claim 5, in which said light beam emitting means includes a plurality of light beam emitting devices and said beam scanner scans the to-be-scanned surface by use of a plurality of light beams emitted from said plurality of light beam emitting devices, and which further comprises:

light beam passage position changing means for changing the passage position of at least one of the plurality of light beams;

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a fourth beam position detector having a plurality of light detecting sections arranged in a row in the sub-scanning direction between said second and third beam position detector, for detecting a plurality of light beams scanned by said beam scanner, a target passage position being set in a mid portion between every adjacent two of said light detecting sections;

beam selecting means for selectively causing one of said plurality of light beam emitting devices to emit light;

a second controller for controlling the passage position of the light beam based on the result of detection of said second and third beam position detectors by use of said light beam passage position changing means to permit one of the light beams scanned by said beam scanner to scan said fourth beam position detector; and

a third controller for controlling the passage position of the light beam based on the result of detection of said fourth beam position detector by use of said light beam passage position changing means to permit the light beam whose passage position is changed by said second controller to pass through one of the target passage positions.

7. (Currently Amended) The apparatus according to claim 6, further comprising:

a fifth beam position detector disposed separately from said second and third beam position detectors in the main scanning direction, for detecting the light beam used for scanning the to-be-scanned surface by said beam scanner and generating an output which continuously decreases with a variation in the passage position of the light beam in the sub-scanning direction;

a sixth beam position detector disposed adjacent to said fifth beam position detector in the sub-scanning direction, for detecting the light beam used for scanning the to-be-scanned surface by said beam scanner and generating an output which continuously increases with a variation in the passage position of the light beam; and

inclination detecting means for detecting whole inclinations of said second to sixth beam position detectors with respect to the scanning direction of the light beam based on the results of detection of said second, third, fifth and sixth beam position detectors.

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8. (Original) A light beam scanning apparatus comprising:

a plurality of light beam emitting devices for outputting light beams;

a beam scanner for reflecting the light beams output from said light beam emitting devices towards a to-be-scanned surface to scan the to-be-scanned surface by use of the light beams in a main scanning direction;

a first beam position detector for detecting the light beam scanned on the to-be-scanned surface by said beam scanner and generating an analog signal which is continuously changed with a variation in the passage position in a sub-scanning direction perpendicular to the main scanning direction of the light beam;

a first target light detecting member having a first passage target and disposed separately from said first beam position detector in the main scanning direction;

a second target light detecting member having a second passage target separated from the first passage target in the sub-scanning direction by a distance corresponding to preset resolution;

light beam passage position changing means for changing the passage position of at least one of the plurality of light beams; and

a controller for controlling the relation of the respective passage positions of the plurality of light beams to a preset relation by use of said light beam passage position changing means based on the outputs of said first beam position detector respectively obtained when the light beam has passed through the first and second passage targets.

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Amdt A* 9. (Original) The apparatus according to claim 8, wherein said controller includes:

B. cont. calculating means for calculating a difference between the outputs of said first beam position detector respectively obtained when the light beam has passed through the first and second passage targets; and

means for changing the passage position of one of first and second light beams among the plurality of light beams by use of said beam passage position changing means to set the difference calculated by said calculating means equal to a difference between outputs of said first beam position detector respectively obtained at the time of scanning by the first and second light beams.

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Amdt A* 10. (Original) The apparatus according to claim 9, which further comprises:

a third target light detecting member having a third passage target and disposed separately from said first beam position detector in the main scanning direction; and

a fourth target light detecting member having a fourth passage target separated from the third passage target in the sub-scanning direction by a distance corresponding to second resolution; and in which

said calculating means calculates a difference between the outputs of said first beam position detector respectively obtained when the light beam has passed through the third and fourth passage targets and said changing means controls said beam passage position changing means to set the difference calculated by said calculating means equal to a difference between outputs of

said beam position detector respectively obtained at the time of scanning by the first and second light beams among the plurality of light beams.

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11. (Original) The apparatus according to claim 8, wherein said controller includes means for calculating an output variation rate with respect to a variation in the passage position of the light beam of said first beam position detector based on the outputs of said first beam position detector respectively obtained when the light beam has passed through the first and second light passage targets; and means for controlling the passage positions of the plurality of light beams based on the variation rate.

12. (Original) A light beam scanning apparatus comprising:

a plurality of light beam emitting devices for outputting light beams;

a beam scanner for reflecting a plurality of light beams output from said plurality of light beam emitting devices towards a to-be-scanned surface to scan the to-be-scanned surface by use of the plurality of light beam;

a first beam position detector for detecting the light beam scanned on the to-be-scanned surface by said beam scanner and generating an output which is continuously changed with a variation in the passage position of the light beam in a sub-scanning direction perpendicular to a main scanning direction of the light beam;

a second beam position detector disposed separately from said first beam position detector in the main scanning direction and having a width in the main scanning direction which is equal to a traveling distance of the light beam on said first beam position detector passed when the light beam scans the first passage position;

a third beam position detector disposed separately from said first beam position detector in the main scanning direction and having a width in the main scanning direction which is equal to a traveling distance of the light beam on said first beam position detector passed when the light beam scans the second passage position, the second passage position being separated from the first

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passage position in the sub- scanning direction by a distance corresponding to preset resolution;

light beam passage position changing means for changing the passage position of at least one of the plurality of light beams; and

a controller for controlling the passage positions of the plurality of light beams to a preset position by use of said light beam passage position changing means based on the outputs of said second and third beam position detector respectively obtained when the light beam has passed through said second and third beam position detector.

13. (Original) The apparatus according to claim 12, wherein said controller includes:

B. cont. calculating means for calculating a difference between the outputs of said second and third beam position detector respectively obtained when the light beam has passed through said second and third beam position detector; and

means for changing the passage position of one of first and second light beams among the plurality of light beams by use of said first beam passage position changing means to set the difference calculated by said calculating means equal to a difference between outputs of said beam position detector respectively obtained at the time of scanning by the first and second light beams.

14. (Original) The apparatus according to claim 13, which further comprises fourth beam position detector disposed separately from said first beam position detector in the main scanning direction and having a width in the main scanning direction which is equal to a traveling distance of the light beam on said first beam position detector passed when the light beam scans the third passage position, the third passage position being separated from the first passage position in the sub-scanning direction by a distance corresponding to second resolution; and in which

said calculating means calculates a difference between the outputs of said second and fourth beam position detector respectively obtained when the light beam has passed through said second and fourth beam position detector, and

said changing means changes the passage position of one of the first and second light beams by use of said beam passage position changing means to set the difference between the outputs of said second and fourth beam position detector equal to a difference between outputs of said first beam position detector respectively obtained at the time of scanning by the first and second light beams among the plurality of light beams.

15. (Original) The apparatus according to claim 12, wherein said controller includes:

calculating means for calculating an output variation rate with respect to a variation in the passage position of the light beam of said first beam position detector based on the outputs of said second and third beam position detector respectively obtained when the light beam has passed through the second and third beam position detector; and

means for changing the passage positions of the plurality of light beams based on the output variation rate by use of said beam passage position changing means.

16. (Currently Amended) An image forming apparatus comprising:
light beam emitting means for outputting a light beam according to an image data;

a beam scanner for reflecting the light beam output from said light beam emitting devices towards an image forming medium to scan the image forming medium by use of the light beam in a main scanning direction for forming an image on the image forming medium according to the image data;

a beam position detector for detecting the light beam scanned on the image forming medium by said beam scanner and generating an ~~analog signal~~ output which is whose analog level is continuously changed with a variation in

the passage position in a sub-scanning direction perpendicular to the main scanning direction of the light beam; and

B' cnt. a controller for controlling the scanning position of the light beam scanned by said beam scanner on the image forming medium to a preset position based on the ~~result of detection of~~ the analog level of the output generated by said beam position detector.
